May 28, 1838.

SIR WM. R. HAMILTON, A. M., President, in the Chair.

Mr. Ball read a paper, by Wm. Thompson, V. P. Nat. Hist. Society of Belfast, "on the Irish Hare." (*Lepus Hibernicus.*)

This paper commenced with a review of what has been written on the subject of the Irish hare, from the time it was brought under the notice of English zoologists in 1833, until the present period. Mr. Thompson stated, contrary to what has been advanced, that the hare of England and Scotland, and that of Ireland, have long been known to differ; and that in 1807 the difference in the fur of the two species was alluded to as a matter of common notoriety, in the MS. of the late John Templeton, Esq. He further stated, that on account of their differing from the Irish species, a number of hares were, upwards of thirty years ago, brought from England, and turned out on the largest of the Copeland Islands, off the county of Down, and that many years since, the Irish hare was, for a similar reason, introduced to the island of Islay, off the coast of Scotland.

The *Lepus Hibernicus* is considered distinct from all described species. It exhibits, in several respects, characters intermediate between the British hares, *L. timidus* and *L. variabilis*, but considered generally, more nearly approximates to the former animal.

The chief result of detailed measurements is shewn in the superior length of the ears and tail of *L. timidus*, compared with those of *L. Hibernicus*. The former, or common hare, displays greater diversity of colour on the head, ears, and body, than the Irish species, which again exhibits greater variety in that of the legs. The most obvious difference in colour (and which has been unnoticed by authors,) is in the tail,

the upper surface of which is black in the *L. timidus*, and white, tinged with greyish towards the base, in the Irish species. On looking to their osteology, some slight differences are observable in the head; the comparatively more horizontal direction of the lumbar vertebra in the Irish hare is conspicuous, and likewise the relative shortness of its tail, which, as first recorded by Mr. Eyton, contains three vertebræ less than that of the English species, 13 only being possessed by the former, and 16 by the latter animal.

The occasional whiteness of fur in the Irish hare is believed by the author to be a consequence of age, and not regulated by the law that is understood to affect the *Alpine* hare, which is considered to change its dark summer fur to white at the commencement of every winter.

The economy and habits of the Irish hare, which generally correspond with those of the common species, are, together with a comparative description of form, colour, &c., very fully detailed in this paper.

Mr. Robert Mallet read a paper "on an hitherto unobserved Force of Elevation and Degradation."

The author maintains, that the forces producing geologic changes are either mechanical or chemical, and that the reaction of these forces, when co-existent, as is usually the case, often gives rise to a third order of forces, which may be denominated molecular forces, or those which, without altering the atomic composition of bodies, affect the arrangement and aggregation of their particles—modify their specific gravity—their action on light, heat, electricity, &c., and produce the varied differences of ductility, hardness, brittleness, &c. &c. While chemical and mechanical forces have been applied to geology, those of this latter class have been almost wholly overlooked.

Of the several known molecular forces, those producing change of volume and of specific gravity are perhaps the

most important, (at least to the geologist,) acting through the medium of heat, chemical combination, and crystallization. The state of our knowledge of these, as a branch of physics, is scanty and deficient, and was presented in the form of five tables, shewing—

1st. Bodies *known* to expand in volume by combination.

2nd. Bodies *known* to expand in volume on changing their state of aggregation or arrangement.

3rd. Bodies *known* to contract in volume in combination.

4th. Bodies *known* to contract in volume in changing their state of aggregation or arrangement.

5th. Bodies whose volume is *known* to remain unchanged in combination.

After stating that these tables were only brought forward as indicative of the class of forces proposed being treated of, and pointing out some of the very singular facts which they contain, of alteration of volume, and the immense force with which it frequently takes place, the author proceeded to apply the results of his own experimental determinations, of change of volume, in solutions of chloride of calcium and sulphate of soda, on mutual decomposition, and of the intermediate oxide of iron in passing to peroxide—to the salt formation of England—and shewing, that if considered as a chemical deposit, an elevation of the surface, of eight feet six inches, will have been produced, by reason of this change of volume only.

A case of observed expansion in volume, by further oxidation of the blue marl, of the saliferous system, and its remarkable effects, was brought forward, and analogy shewn with the indurating marl forming the bottom of Lake Superior. The effects of these swellings, in all directions of a mass, in producing consolidation and integration of its parts, is there pointed out.

The author then proceeds to apply this principle, to account for the formation of the contemporaneous quartz veins

in granite, which he does by shewing that the average analysis of granite gives more quartz than is necessary to the definite constitution of its ingredients; that these have crystallized from fusion, in the order quartz, mica, fellspar: and that by the successive *expansion* of each set of crystals, the residual quartz has been pushed from the surfaces of cooling, towards the central and hottest parts of the mass, there forming quartz veins.

It is suggested, that the expansion produced by *sudden* crystallization (of which instances are not wanting) may give rise to earthquakes; that the exact filling of whyn dykes, notwithstanding the contraction on cooling of the dyke and its walls, must be due to the same cause. The principle is then carried to the solution of some cases of atmospheric degradation. The Yorkshire flagstone desquamates parallel to the wrought surface, and across its lamina. This arises from induration, and crystallization of its argillo-calcareous cement, which increases in volume, and splits off the desquamated portion. The same is the case with the onion stone of the Causeway—both desquamate by air and moisture, without the agency of frost. Lastly, it is shewn, that this expansion in volume does not always necessarily infer disruption.

The author intends his paper only as an indication of a wide class of forces, as yet little considered or applied by the geologist, and which, although from the present condition of geology as a science they cannot be often estimated, must, in its future progress, form an important element of connexion in all its greater problems.

Mr. Samuel Ferguson read a paper, entitled "Remarks on the late Publication of the Society of Northern Antiquaries."

The object of this paper was to add some corroboratory evidences to the fact established in the Antiquitates

Americanæ, published by the Royal Society of Northern Antiquaries, that the Irish had been acquainted with the continent of North America previous to the time of Columbus.

From the fact that at least two sorts of dye-woods were known in Europe by the name of *wood of Brazil*, before the discovery of the American continent, the author inferred that Brazil was the name of an already discovered country, from which these woods had been brought. But a country of indefinite magnitude, called the island of Brazil, is found marked in numerous maps, made before and about the time of Columbus; and from the position of this country in the Atlantic, to the south-west of Ireland, it cannot be identified with any other part of the world than the continent of North America. Again, from its being represented as bounded, at least on two sides, by the sea, and divided by a great river, it appears to correspond more peculiarly with the southern states of North America, between the Atlantic and the the river Mississipi. But this is *Irland it Mickla*, or Great Ireland, the district which the northern histories represent as inhabited by a *white Christian* people, speaking a language like the Irish; and logwood, which is often confounded with Brazil wood by the earlier naturalists, grows as far north as these latitudes.

Hence it was surmised, that possibly the precious *mausur* wood, spoken of in the northern histories as having been brought by the Scandinavians from America, may have been one of the dye-woods known in Europe before the time of Columbus, by the common name of Brazil wood.

Further, in one of the maps referred to, the island of Brazil is represented south of another island, of indefinite magnitude, called "Mons Orins," which would thus appear to be referred to the position of the Scandinavian settlement of Vineland. But in the state of Rhode Island, which the Northern Antiquaries identify with part of the Vineland of

their histories, is a stone, covered with sculptures and inscriptions of the ante-Columbian era, on which the word ORINX, or as some read, ORINS, is the only one legible.

Again, the tradition of the island of O'Brazil is still vividly preserved, both by the Irish and the Welsh, and it is by this name the latter indicate the country alleged to have been discovered by their Madoc. So strong was the belief in this tradition in Ireland, in the seventeenth century, that a patent is said to have been taken out for the island, when it should be discovered, and a pamphlet, purporting to be an account of its discovery, obtained circulation in London in 1675.

From these considerations the author inferred, that perhaps the story of St. Brendan, who is said to have spent seven years in the land of promise, at the other side of the Atlantic, may not have been altogether without foundation, and that if so, it is not improbable that Christianity may have been introduced into the new world by Irish ecclesiastics of the 6th century.

Professor Kane read a paper "on the Ammoniacal and other Basic Compounds of the Copper and Silver Families."

Having verified Berzelius' formula for the ammoniacal sulphate of copper $Cu\,SO_3 + 2\,NH_3 + HO$., Dr. Kane pointed out, that, from the circumstances of its formation, and others, the real formula must be $(NH_3HO + SO_3) + NH_3.Cul$; and that by heat it loses $NH_3.HO$. and leaves a compound $NH_3.Cu\,O + SO_3$.; by still more heat there remains $2\,SO_3 + 2\,Cu\,O + NH_3$ or $Cu O.SO_3$. + $(NH_3.Cu\,O)\,SO_3$. and by water there is formed the ordinary basic sulphate $CuO.SO_3 + 3\,CuO + 4\,HO$.

Dr. Kane describes likewise a new basic sulphate as $SO_3 + 8\,Cu\,O + 12\,HO$. and he arranges these two salts as

$$1 = Cu\,O.SO_3\,Cu\,O + 2\,(Cu\,O + 2\,HO).$$
$$2 = Cu\,O.SO_3.\,Cu\,O + 6\,(Cu\,O + 2\,HO).$$

and seeks to establish an analogy with the ordinary salts of the same family, as

$ZnO.\,SO_3\,HO + 6.\,HO$ and $Cu\,O.SO_3.Cu\,O + 6\,Cu\,O$

Dr. Kane found the ammoniacal chloride of copper to be $cu\,cl + 2\,NH_3 + HO$. or correctly, $NH_3.\,H\,cl + NH_3.\,cu\,o$. By heat $NH_3\,HO$ is lost, and there remains $NH_3.\,H\,cu\,cl$. By water there is generated a new basic chloride of copper, having the formula $cu\,cl + 4\,cu\,o + 6\,HO$. The common Brunswick green $cu\,cl + 3\,cu\,o + 4\,HO$. Dr. Kane has obtained with 6 HO in place of 4 HO. and these oxychlorides he considers as formed on the type of the ordinary chlorides, combined with water, or with metallic oxides in other groups.

$$1 - cu.\,cl + cu\,o + 2\,(cu\,o + 2\,HO)$$
$$2 - cu\,cl + \quad 3\,(cu\,o + 2\,HO)$$
$$3 - cu\,cl + cu\,o + 3\,(cu\,o + 2\,HO).$$

When No. 2 is heated, it loses all water, but if then put into contact with water, it regains 4HO, and becomes perfect Brunswick green No. 1. $cu\,cl.\,cu\,o + 2\,(cu\,o + 2\,HO)$.

The second equivalent of oxide is, in these chlorine bodies, much less forcibly held than in the sulphates, but that it is differently related to the acid than the remaining equivalents of oxide or of water is proved by a great variety of facts.

The ammoniacal nitrate of copper has the formula $cuo\,NO_5 + 2\,NH_3$. or $(NH_3.HO.)\,NO_5 + cu\,NH_2$. hence this body contains, united with the copper, amidogen; when heated it explodes, the copper and amidogen burning in the nitrous oxyde yielded by the nitrate of ammonia. To obtain some analogical evidence regarding this body, Dr. Kane re-examined the ammonia-sulphate and nitrate of silver, and found George Mitscherlich's results good. Dr. Kane, however, writes the formulæ

$$1 - (NH_3.HO).\,RO_3 + Ag.NH_2$$
$$2 - (NH_3.HO)\,NO_5 + Ag\,NH_2.$$

This last salt, when heated, gives a beautiful decomposition; the nitrate of ammonia fuses readily, and at a temperature below that at which it decomposes, the amide of silver is resolved into ammonia, nitrogen, and metallic silver, which

latter being deposited on the sides of the glass, from the liquid nitrate of ammonia, gives a mirror surface equal to that obtained by aldehyd.

On analyzing the ammoniacal compounds of nickel, Dr. Kane found the results of Erdman completely verified; but from the inferior affinity with which the ammonia was retained, these compounds did not yield as positive results as to their influence on theory, as those of the copper class.

A new substance, discovered in the course of these researches, may be termed a fulminating copper. It is a blue powder, decomposed by heat into metallic copper, water, ammonia, and nitrogen. Its formula is $3cuO + 2NH_3 + 6HO$.

The examination of the zinc compounds has lead to the discovery of a considerable number of new bodies. The ammoniacal sulphate of zinc crystallized is

$$1 - znO.SO_3 + 2NH_3 + 3HO$$

exposed to the air, it effloresces losing HO, and becomes

$$2 - znO.SO_3 + 2(NH_3.HO).$$

which, if heated, gives at 212° F.

$$3 - znO.SO_3 + (NH_3.HO.)$$

but at dull redness loses still $NH_3.HO$ and leaves $znO.SO_3$.

If No. 1 be exposed longer to a moderate heat it loses 2 HO. and there remains,

$$4 - zno\ SO_3 + 2NH_3 + HO$$

If this be heated to 300°, it loses (NH_3 HO) and there is

$$5 - znO.SO_3 + NH_3.$$

which further gives by heat

$$6 - 2(znO.SO_3) + NH_3$$

from which the ammonia cannot be expelled without decomposition.

Selecting from among these No. 2, for reduction to its rational formula, it becomes

$$(NH_3.HO.)\ SO_3 + znO.\ (NH_3.HO).$$

Now the oxide of zinc from the sulphate being redissolved by potash, there must be formed the similar compound

$$K.O.SO_3 + znO.KO.$$

This cannot be obtained crystallized, for if the liquor be evaporated there is deposited $KO.SO_3$, and $znO.KO$ remains dissolved; from this, by exposure to the air, there are gradually deposited small crystals, which Dr. Kane considers as being

$$KO.CO_2 + zn.O.CO_2 + 2\,HO.$$

but by heat there is carbonic acid given off, and a powder insoluble in water is produced, the composition of which, from Dr. Kane's examination, appears to be

$$KO.CO_2 + znO.CO_2 + 2\,znO.$$

It will be recollected, that the bicarbonate of potash is

$$KO.CO_2 + HO.CO_2.$$

By treating the ammonia sulphate No. 3 or 5 by water, there is obtained a basic sulphate, having the formula

$$znO.SO_3 + 6\,znO + 12\,HO.$$

which, dried and exposed to the air, slakes, and gives

$$znO.SO_3 + 6\,znO + 3\,HO.$$

This new salt has some remarkable relations to those already known.

There are two ammonia chlorides of zinc.

No. 1, in pearly scales of a talcy lustre, consists of

$$zn\,Cl + 2\,NH_3 + HO,$$

and, when heated, gives off $NH_3.HO$. leaving $NH_3.zn\,Cl$. a white powder.

No. 2 is in fine quadrangular prisms, brilliant lustre, consisting of $2\,zn\,Cl + 2\,NH_3 + HO$. or, as Dr. Kane considers, $zn.Cl + (NH_3.HCl) + NH_3.znO$. which losing $NH_3.HO$ leaves $zn\,Cl + NH_3.zn\,Cl$. a white mass, fusible, congealing into a mass like gum, and volatilizable. This gummy mass is likewise obtained by heating $NH_3zn\,Cl$.

There is generated by the action of water on these basic ammoniacal compounds, an oxychloride of zinc of a very remarkable character: it is—

$$zn\,cl + 6\,zn\,o + 12\,ho.$$

dried, it is reduced at 212° to 9 ho + and by 300° to 6 ho. By 500° all water is driven off, and there remains $zn\,cl + 6\,zn\,o$ which exposed to the air absorbed 3 ho. Hence the general expression is

$$zn\,cl + 6\,zn\,o + 3\,ho + 3\,ho + 3\,ho + 3\,ho$$

and comparing some similar chlorides, there is,

1 $ca.cl + 6$ ho crystallized chloride of calcium.
2 $zn\,cl + 6\,zn\,o$ — basic chloride of zinc dry.
3 $h\,cl + 6$ ho — strong muriatic acid.
4 $zn\,cl + 6\,zn\,o + 12$ ho — hydrated oxychloride of zinc.
5 $h\,cl + 6$ ho $+ 12$ ho — muriatic acid with a constant boiling point.

Another oxychloride, having the composition

$$zn\,cl + 9\,zn\,o + 15\,ho$$

which dried and exposed to air, absorbs 6 ho. Hence it may best be considered as

$$(zn\,cl + 6\,zn\,o + 12\,h\,o) + 3\,(zn\,o\,ho),$$

giving ultimately

$$(zn\,cl + 6\,zn\,o + 3\,ho + 3\,(zno + ho)$$

Mr. Petrie then read the following Report, from the Committee of Antiquities:—

At a meeting of the council, on Monday last, the President read the following letter, which he received from Mr. Drummond, the Under Secretary of State.

Dublin Castle, May 19, 1838.

"My dear Sir,

"I am informed, that in levelling a mound in the Phœnix Park, on the eastern flank of the

Hibernian School, an ancient tomb has been discovered, which is of considerable interest, and fitted to throw much light on the disputed question of the origin of 'cromlechs.'

"I beg, therefore, to suggest, that a deputation from the Royal Irish Academy should visit and examine this tomb.

"I am, my dear Sir,
"Very faithfully yours,
"T. DRUMMOND.

"*Sir Wm. Rowan Hamilton,*
"*&c. &c.*"

In consequence of this communication, the council appointed the Committee of Antiquities as a deputation from the Academy, to examine and report on the circumstances connected with this interesting discovery; and the Committee accordingly, with the President and many other members, assembled on the spot, on Wednesday last, and made the examination, and ascertained the particulars of which they now present their Report.

It appears that some days previously, the workmen employed in the improvements now making in the Park, under the direction of the Commissioners of Woods and Forests, had been removing an ancient tumulus, or sepulchral mound, situated to the west of the Royal Hibernian School. This mound was 120 feet in diameter, and 15 in height, and was popularly known in the neighbouring village of Chapelizod by the Irish appellation of Cnoc-maraidhe, a name which, according to the best Irish scholars who have been consulted, appears to signify the hill of the mariners. This tumulus appears to be surrounded by several smaller ones, not yet disturbed.

Within the tumulus, but at the distance of several yards from the centre, the men discovered four small sepulchral vases, containing ashes of burned bones. These urns were enclosed within small stone kists, but were unfortunately

broken through want of care in the excavation. One of them, however, is nearly perfect, having fortunately been saved by Mr. Larcom, who was riding past the spot shortly after their discovery.

These urns, which, as usual, are of baked clay, exhibit a greater degree of taste in art than those commonly found, particularly in one example, which is unfortunately broken, and on which the ornaments are in relief.

Subsequently, in the centre of the mound, a tomb was discovered, and the workmen were stopped from proceeding further, in order that its examination might be directed by the deputation from the Academy. That this course was a judicious one, and led to discoveries interesting to antiquarian science, which would not otherwise have been made, will appear from the following results.

The tomb consists of a table, or covering stone, 6 feet 6 inches in length, from 3 feet 6 inches to 3 feet in breadth, and 14 inches in thickness. This stone rested on five supporting stones, varying from 2 feet 6 inches to 1 foot 3 inches in breadth, and about 2 feet in height. Of these supporters there was one which did not actually touch the covering stone, a small stone, since removed, having been wedged between it and the latter; and there were five other stones, not used for supports, but as forming the enclosure of the tomb. One

of these, on the east side, was removed, that the interior might be examined. The apertures formed by the irregularities in the shapes of these stones were filled up by smaller stones, placed against them, to prevent the stones and earth of the tumulus from falling into the tomb. All these stones are limestone, and, with the exception of the covering slab, water-worn, and even the latter appears to be partly so.

In the recess thus enclosed, two perfect male human skeletons were found, and also the tops of the femora of another, and a single bone of an animal, supposed to be that of a dog. The heads of the skeletons rested to the north, and, as the enclosure is not of sufficient extent to have permitted the bodies to lie at full length, they must have been bent at the vertebræ, or at the lower joints. In both skulls the teeth are nearly perfect, but the molars were more worn in one than in the other.

Immediately under each skull was found collected together a considerable quantity of small shells, common on our coasts, and known to conchologists by the name of *Nerita littoralis*. On examination, these shells were found to have been rubbed down on the valve with a stone, to make a second hole—for the purpose, as it appeared evident, of their being strung to form necklaces; and a vegetable fibre, serving this purpose, was also discovered, a portion of which was through the shells.

A small fibula of bone, and a knife, or arrow-head, of flint, were also found.

For the preservation of all these interesting remains, which His Excellency the Lord Lieutenant has presented to the museum of the Academy now forming, the Academy are indebted to Mr. Drummond, and to the zealous exertions of Mr. Larcom, who has had a case made for their present safety.

How far the discovery of this tomb may contribute to settle the disputed point among antiquaries, of the original purpose of the cromlech, or whether this sepulchre properly

belongs to that class of monuments generally supposed to have been altars, or that called kiswaens, which are acknowledged to have been tombs, it is not for this Committee collectively to express an opinion; but, from the rudeness of the antiquities discovered within its enclosure, they may venture to refer the date of its erection to the earliest period of society in Ireland; and as it has been ascertained that interments of different ages have been made within the same tumulus, it may also be inferred, with every appearance of probability, that the urns found within this mound, from the superior degree of art exhibited in their ornaments and formation, should be attributed to a later age than the original tomb.

The thanks of the Academy were voted to His Excellency the Lord Lieutenant.

The thanks of the Academy were also voted to Mr. Drummond and to Mr. Larcom.

DONATIONS.

Memoires de l'Academie Royale des Sciences Morales et Politiques de l'Institut de France. Tome 1, (2 Série.) Presented by the Academy.

Comptes Rendus Hebdomadaires des Séances de l'Academic des Sciences; Par MM. les Secretaires Perpetuels. Premier Semestre. Nos. 17, 18, for 1838. Presented by the Academy.

Journal of the Statistical Society of London. No. 1, May 1838. Presented by the Society.

Proceedings of the Royal Society. Nos. 31, 32. Presented by the Society.

Transactions of the Historical and Literary Committee of the American Philosophical Society, held at Philadelphia, for promoting Useful Knowledge. Presented by the Society.

Catalogue of Circumpolar Stars, deduced from the observations of Stephen Groombridge, Esq. F. R. S., S. R. A. Nap. &c. &c. Reduced to January 1st, 1810. Edited by George Biddell Airy, Esq. A. M. Astronomer Royal. Printed at the public expense, by the Lords Commissioners of the Admiralty. Presented by the Lords Commissioners of the Admiralty.

The Ordnance Survey of the County of Roscommon, in fifty-eight sheets, including the Title and Index. Presented by His Excellency the Lord Lieutenant.